U.S. Department of Justice

Federal Bureau of Investigation

mtDNA Population Database
Read-Me Document

Contents

1.0   OVERVIEW

☼ **Note**: Read this document thoroughly before downloading the mtDNA Population
Database installation program.

1.1   Summary of Population Databases

There are two population databases available in the mtDNA Population Database:
Forensic and Published. Below are three tables that describe the details of the databases.

Available databases

Database Profiles	
Forensic	4839
Public	6106
Total	10945

Details of Forensic Database

Name	Count Of Forensic Profiles
African-American	1148
Apache	180
Caucasian	1655
China/Taiwan	356
Egypt	48
Guam	87
Hispanic	686
India	19
Japan	163
Korea	182
Navajo	146
Pakistan	8
Sierra Leone	109
Thailand	52
Total	**4839**

Details of Published Database

Name	Count Of Published Profiles
Afr:Abo:Biaka:ZAF	5
Afr:Abo:Nguni:ZAF	14
Afr:Abo:Niger	22
Afr:Abo:San:ZAF	14
Afr:Abo:Sotho-Tswana:ZAF	22
Afr:Abo:Tsonga:ZAF	14
Afr:Algeria	77
Afr:Anc:EGY	1
Afr:Anc:NER	2
Afr:Benin	13
Afr:Bioko Is:STP	91
Afr:Malawi	7
Afr:Nigeria	2
As:Abo:Evenk:RUS	11
As:Abo:Nivkh:RUS	2
As:Abo:Tibet:CHN	1
As:Abo:Udegey:RUS	2
As:Cambodia	12
As: Hong Kong: CHN	140
As:Japan	238
As:Kazakhstan	107
As:Krygyzstan	95
As:Mongolia	83
As:Turkey	94
As: Viet Nam	9
CeAm:Abo:Boruca:PAN	2
CeAm:Abo:GTM	22
CeAm:Abo:Guayami:PAN	1
CeAm:Abo:Kuna:PAN	63
CeAm:Belize	27
Eur:Anc:DEU	1
Eur:Ancient:FRA	3
Eur:Bulgaria	30
Eur:Denmark	47
Eur:Estonia	28

Name	Count Of Published Profiles
Eur:Finland	320
Eur:France	39
Eur:Germany	368
Eur:Great Britain	386
Eur:Greece	1
Eur:Iceland	74
Eur:Italy	140
Eur:Norway	222
Eur:Portugal	68
Eur:Spain	324
Eur:Switzerland	228
Eur:W Russia	126
Euro:Anc:AUT	1
NoAm:Abo:Apache	1
NoAm:Abo:CAN	26
NoAm:Abo:Navajo	2
NoAm:Abo:Ojibwa/Chippewa	3
NoAm:Abo:Pima	3
NoAm:Abo:Tlingit	2
NoAm:Abo:Windover	14
NoAm:Abo:Yucatan:MEX	4
NoAm:Afr:USA	3
Oce:Abo:AUS	9
Oce:Abo:Hawaii:USA	17
Oce:Abo:Vanuatu	92
Oce:Abo:Waripiri:AUS	115
Ocea:Abo:Micronesia	18
Ocea:Abo:Polynesia	1
Ocea:Abo:Polynesia:FRA	17
Ocea:Malaysia	43
Ocea:New Zealand	23
SoAm:Abo:Amazon:BRA	92
SoAm:Abo:Krahoa:BRA	3
SoAm:Abo:Patagonia:ARG	39
SoAm:Abo:Ticuna:BRA	3
SoAm:Abo:Yanomama:BRA	53

Name	Count Of Published Profiles
SoAm:Afr:Brazil	42
SoAm:Anc:BRA	18
SoAm:Anc:COL	6
SoAmer:Abo:Mataco:ARG	3
Unknown Origin	1855
Total	**6106**

☼ **Note:** The published profiles have not been manually reviewed.

1.2 Supported Environment

1. An IBM compatible computer with a minimum of 16MB of RAM.
Operating system:
a. NT 4.0 w/SP 5 (or later)
b. Windows 95 w/SR 2 (or later)

…Or…

An IBM compatible computer with a minimum of 60MB of RAM.
Operating system:
a. Windows 2000 w/SP 2 (or later).

2. Internet browser – Internet Explorer 5.0 or later.

☼ **Note**: mtDNA Population Database has been tested on the following platforms –
Windows 2000 w/SP 2 with Internet Explorer 5.5

☼ **Note**: The mtDNA Population Database software does not support adding new profiles.

1.3 Installation Information

The mtDNA Population Database installation program is a 5.69 MB file called
"mtDNA.exe".

☼ **Note**: For information on using the mtDNA Population Database, see the User's Manual
available in <u>Forensic Science Communications</u>, April 2002, Volume 4, No. 2. See this
document online at: http://www.fbi.gov/hq/lab/fsc/april2002/mtDNA.htm.

1.4   Recommended Search Options

After the mtDNA Population Database has been installed, the following changes to the Search options are recommended:

- General tab
  - o The List These Profiles box should be checked and should display up to 2 differences.
  - o The Ignore All Insertions box should be checked.
- Search tab
  - o The Use Partially Overlapping Profiles box should be checked.
  - o The Statistics section should display up to 5 differences.
- Pairwise tab
  - o The List These Haplotypes box should be checked.
- Date tab
  - o The All Profiles box should be checked.
- Heteroplasmy tab
  - o The Heteroplasmic Scenerios box should be unchecked.

2.0   DIFFERENCES BETWEEN MITOSEARCH AND THE mtDNA POPULATION DATABASE

Entering a range of 40-41 in the HV2 boxes caused an invalid property error.

In Mitosearch, a coding error prevented this range from being entered. Attempts to enter HV2 range 40-41 resulted in the range being rejected as invalid when it is a valid range. The code has been corrected in the mtDNA Population Database, and this error no longer occurs.

Supporting tables reflect requested changes.

- In the Groups table, "America, North" has been changed to "America, North & Central", and "America, South & Central" has been changed to "America, South" to reflect correct geographical orientation.

- In the Published Database table, the Group IDs of "CeAm:Belize", "CeAm:Abo:GTM", "CeAm:Abo:Kuna:PAN", "CeAm:Abo:Guayami:PAN", and "CeAm:Abo:Boruca:PAN" have been changed from 9 to 8 to reflect the correction described in Item 1 above.

The maximum ranges in mtDNA Population Database have been extended to HVI: 15996 - 16569 and HVII: 1 - 618.

In Mitosearch, the "Run-time error '9': Subscript out of range" occurred when profiles with data beyond HVI: 16024 – 16365 and/or HVII: 73 – 340 were searched. For the mtDNA Population Database, the searchable region extends beyond HVI and HVII regions to the whole control region, 15996 – 16569 and 1 – 618.

3.0   ITEMS TO CONSIDER

The Database Status does not update when a database without profiles is selected.

In the Pairwise window, if a database that has no profiles in it is selected, then the "Compare" button will be disabled and the Current Database Status data will not be updated. However, if another database that does contain profiles is highlighted (but its checkbox is not selected), then the "Compare" button will remain disabled and the Current Database Status data will still not be updated. There is code in mtDNA Population Database that prevents a selected database containing zero profiles from being compared, because it contains no data. In order to enable the "Compare" button and update the Current Database Status information, select the checkbox of any database that contains profiles within the selected range. Once the "Compare" button is enabled, any highlighted database will display updated Current Database Status information.

mtDNA Population Database produces a runtime error when more than 46 nucleotide polymorphisms are entered in the database.

There are a fixed number of columns allowed by the software per profile in the database. mtDNA Population Database recognizes a maximum limit of 50 columns per profile, with four of these columns devoted to HVI and HVII range values. The database contains profile tables showing 41 available columns; however, the mtDNA Population Database has the capability to expand by up to five columns, allowing users to enter profiles with up to, but not exceeding, 46 nucleotide polymorphisms. If the user attempts to enter more than 46 nucleotide polymorphisms in the database and then searches this profile, the following runtime error will occur: "Subscription Out of Range." The program aborts after exiting the error message. To avoid this runtime error, the user should not attempt to add more than 46 nucleotide differences per profile to the database.

mtDNA Population Database HVI, HVII, and CRS data lags.

If HVI, HVII, and CRS data is not cleared or deleted after being entered into the database, some of the data will lag behind on the main search screen even if database settings have been changed. To avoid this, use the "Clear All" function after entering each profile, or right-click the data and select "Delete."

The pairwise search feature in the Published Profiles database is not enabled.

Runtime errors occur when a pairwise search is performed on the Published Profiles database. This problem was first noted when a pairwise search was run on the "As: Hong Kong: CHN" database with the configured HVI and HVII ranges set to default values (HVI: 16024-16365; HVII: 73-340). The message "Runtime Error '6': Overflow" displayed, and this error caused an application crash. This is due to a "divided by zero" condition that can occur in the formula used to calculate the standard deviation under certain circumstances. To prevent runtime errors and application crashes from occurring during any other pairwise search on the Published Profiles database, the pairwise search feature has been disabled.

Searches may return incorrect information if the database is searched by multiple users.

The mtDNA Population Database software is configured for a single user. If another user makes changes to this configuration in order to perform a search, the software will change search criteria but will not alter the screen displaying the configuration set up by the first user. This means that when the first user views their configuration, they may be viewing search criteria that do not match what the database is actually set to search. Thus, the first user may receive incorrect results for their search. To avoid this problem, each instance of the mtDNA Population database will be installed on a single client computer; this way each user will have their own copy of the mtDNA Population Database client, and there should not be any interference caused by searches by multiple users.

A run-time error causes the mtDNA Population Database to become corrupted.

The mtDNA Population Database software is vulnerable to corruption if it is shut down improperly. "Run-time error '3509'" will occur, followed by a system crash. This problem may be caused by such occurrences as a sudden power outage, or by the software being close by selecting "End Task" from the Task Manager. If the mtDNA Population Database software closes in this manner, it becomes extremely vulnerable to corruption in its tables. To avoid corrupted data, the software must be uninstalled from Windows and then reinstalled.

Inserted values to the "Difference from" list box may appear incorrectly when retrieved from the mtDNA Population Database.

In a test of the software, a profile was entered with more than ten values in the "Differences from CRS" list. This profile contained the values "16124.1C" and "16124.10C" in the first and tenth insertions, respectively. When this profile was retrieved from the database, the value "16124.10C" appeared incorrectly as "16124.1C". "16124.1C" thus appeared in two places in the list box. This was caused by a condition in mtDNA that treats nucleotide location as a number, and therefore does not treat zero as a number. This condition will occur when any value with a nucleotide location that includes a zero is entered (i.e., the 10th, 20th, etc. locations). To prevent values from being altered in this way, if possible avoid inserting more than nine "Difference from" values for each profile.